

TABLE 1.—Solar radiation intensities during February, 1927

Washington, D. C.

[Gram-calories per minute per square centimeter of normal surface]

Date	Sun's zenith distance										Local mean solar time	
	8 a.m.	78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°		
	75th mer. time	Air mass										
		A. M.					P. M.					
		e.	5.0	4.0	3.0	2.0	1.0	2.0	3.0	4.0		5.0
Feb. 2-----	mm.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mm.	
7-----	3.99	0.69	0.79	0.98	1.25	1.57	1.17	0.96	0.89	0.80	3.81	
10-----	4.17	0.62	0.70	0.87	1.07	1.07	1.10	0.82	0.82	0.82	4.17	
11-----	4.75	-----	-----	-----	1.08	-----	-----	-----	-----	-----	4.37	
17-----	3.63	-----	0.73	0.91	1.22	1.64	1.28	-----	-----	-----	2.16	
26-----	7.29	0.85	0.97	1.08	1.32	1.62	-----	-----	-----	-----	5.79	
Means-----	5.36	0.77	0.89	1.04	1.26	1.52	1.26	-----	-----	-----	2.49	
Departures-----	-----	0.73	0.82	0.93	1.20	1.59	1.20	(0.89)	(0.89)	(0.80)	-----	
Departures-----	-----	+0.02	+0.01	±0.00	+0.03	-----	+0.01	+0.08	+0.05	+0.03	-----	

Madison, Wis.

Feb. 3.....	5.56	-----	-----	-----	1.31	-----	1.41	1.18	-----	-----	5.16
9.....	1.52	-----	-----	-----	-----	-----	1.35	-----	-----	-----	1.78
10.....	1.24	1.04	1.15	1.28	1.43	-----	-----	-----	-----	-----	1.19
11.....	2.26	-----	-----	-----	1.24	-----	-----	1.18	-----	-----	3.15
12.....	1.78	1.02	1.11	1.25	1.42	1.62	-----	-----	-----	-----	1.78
15.....	1.88	-----	-----	1.08	-----	-----	-----	-----	-----	-----	4.95
18.....	0.86	-----	-----	-----	1.43	-----	1.43	1.21	-----	-----	1.37
19.....	1.52	-----	0.87	1.07	1.32	-----	1.29	-----	-----	-----	2.06
21.....	2.36	-----	-----	0.95	1.24	-----	-----	-----	-----	-----	3.00
24.....	3.99	-----	-----	1.24	1.40	1.58	1.38	-----	-----	-----	3.99
Means.....	(1.03)	1.04	1.14	1.35	(1.60)	1.37	1.37	1.19	-----	-----	-----
Departures.....	+0.09	+0.07	+0.09	+0.02	-----	-----	+0.01	+0.01	-----	-----	-----

Lincoln, Nebr.

Feb. 1.....	2.87	1.02	1.15	1.28	1.43	1.58	-----	-----	-----	0.96	3.00
9.....	1.24	-----	-----	-----	-----	-----	1.36	-----	1.11	0.96	1.37
10.....	1.78	-----	0.93	1.15	1.40	-----	1.40	1.27	1.08	1.01	2.62
11.....	2.62	-----	-----	1.03	1.35	-----	-----	1.23	0.95	-----	2.74
18.....	0.74	1.08	1.21	1.35	1.51	1.69	1.39	1.01	0.96	0.91	0.91
23.....	4.17	-----	0.98	1.13	1.38	-----	1.38	1.17	1.13	1.01	3.99
24.....	4.17	-----	-----	-----	-----	-----	1.34	-----	-----	-----	4.57
25.....	3.30	1.00	1.11	1.34	1.45	1.58	-----	-----	-----	-----	3.45
Means.....	1.03	1.08	1.21	1.42	1.62	-----	1.37	1.17	1.05	0.97	-----
Departures.....	+0.06	+0.03	+0.01	+0.04	-----	-----	+0.02	+0.00	+0.01	+0.05	-----

* Extrapolated.

TABLE 2.—Solar and sky radiation received on a horizontal surface

[Gram-calories per square centimeter of horizontal surface]

Week beginning—	Average daily radiation					Average daily departure from normal		
	Washington	Madison	Lincoln	Chicago	New York	Washington	Madison	Lincoln
1927	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.
Jan. 29.....	198	187	233	139	154	+6	-4	-4
Feb. 5.....	175	199	283	139	117	-32	-10	+20
12.....	186	200	243	127	119	-39	-32	-45
19.....	169	302	333	244	141	-78	+52	+23
Deficiency since first of year on Feb. 25.....	-----					-1,687	-406	-553

PHOTOHELIOGRAPHIC OBSERVATIONS

[Communicated by Capt. EDWIN T. POLLOCK, Superintendent, United States Naval Observatory. Data furnished by the Naval Observatory in cooperation with Harvard, Yerkes, and Mount Wilson Observatories]

METHODS USED TO OBTAIN POSITIONS AND AREAS OF SUN SPOTS

UNITED STATES NAVAL OBSERVATORY, WASHINGTON, D. C.

The measured positions and areas of solar spots and groups herewith published were made from negatives taken with the 40-foot horizontal photoheliograph of the United States Naval Observatory. The 40-foot objective

(12.192 m.) is of 5 inches (12.7 m.) aperture, corrected for actinic rays, and the solar image at the focus of the instrument is about $4\frac{1}{4}$ inches (10.8 cm.) in diameter. It is used in conjunction with an unsilvered plane mirror to throw the solar light in the proper direction. Photographs are taken daily near noon, weather permitting.

Dry plates 7 inches square are employed, coated with a slow lantern-slide emulsion, and are backed with a paste of Winsor and Newton moist lampblack before exposure, to prevent halation. Just in front of the photographic plate hangs a plumb line of fine wire which casts a sharp shadow image upon the solar disk during exposure. This exposure is made by a drop shutter with an adjustable slit located just in front of the plate. The vertical image of the plumb line impressed on the negative, together with the eastern standard time of exposure, furnish data for orientation of the plate.

An ingenious instrument recently devised by Mr. Watts and Miss Lamson, of the Naval Observatory, and constructed by the instrument maker at the observatory, was used for these measures.

Transparencies having the sun's outline and heliographic coordinates ruled for each 10° , corresponding to the period of observation, are used with this instrument. From these transparencies the heliographic latitudes and longitudes of the solar markings may be directly read, after setting for the proper position angle of the sun's axis at the time of observation. Areas to the nearest whole square degree are measured similarly, on a separate reticule line chart. Foreshortening is allowed for on this chart as the solar limb is approached, so that the true area is determined. Unless the larger spots comprising a group indicate individuality, the position measured is referred to the mean center of the group as a whole. With respect to position and area of spots, both umbra and penumbra are here considered as an entity. Faculae are not included in these measures. For well defined objects not too near the limb these positions are probably accurate to $\pm 0.5^\circ$.—G. H. Peters.

HARVARD COLLEGE OBSERVATORY

The solar image is photographed every clear day at the Harvard Astronomical Laboratory, using the Clark 8-inch equatorial with negative-enlarging lens to produce an equivalent focus of 553 centimeters, giving a solar image of about 6 centimeters diameter with a scale of 1 millimeter, representing about 14,500 miles or 24,000 kilometers near the center of the solar image. The telescope carries a special solar attachment for photographing the image, using a focal plane curtain shutter which may be adjusted in speed and opening to produce any exposure down to one-thousandth of a second. A color screen, selected to best suit the objective, was manufactured for us by the Eastman Kodak Co. The color curve of the lens was first determined and used as a basis for the selection of the proper filter. The filter is placed in the plate holder immediately in front of the plate. The objective is provided with a stop holder which makes possible the diminution of the light received on a clear day. An aperture of about 6 inches is used with an exposure of one five-hundredth of a second on a "Cramer contrast" plate.

The east and west line is located from the short dimension edge of the 4 by 5 inch plate, this being squared with the camera, which is carefully oriented by trails and clamped in place on the draw tube of the telescope.